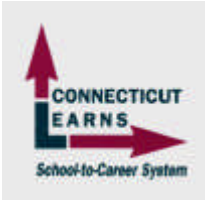
Industry Skills Standards

Jobs and Skill Requirements
for Entry-Level Workers
2000-2005

Construction Technologies & Design

A project of the
Connecticut Business & Industry Association,
in collaboration with the
School-to-Career Partnership
of the State Departments of Education, Higher Education and Labor.



AN INTRODUCTION TO
THE CONSTRUCTION TECHNOLOGIES AND DESIGN CLUSTER

The design and construction of homes, buildings, bridges and roads is a major category of jobs in the Connecticut economy.

Some knowledge of the whole industry is a cornerstone skill for people who are interested in a range of different jobs — buying and developing land, designing projects or building them.

Jobs in the construction industry require various levels of education and training after high school. Becoming an architect or an architectural technician requires several years of college, while certain skilled workers, such as plumbers and electricians, need to spend time as apprentices to become licensed. Carpenters on very large construction projects may learn their skills by serving a structured apprenticeship with a union, while many carpenters in the home building area learn their skills on the job in a less formal way. Small contractors need to understand the principles of running a small business. Large companies in the construction industry need people with manage-ment, business and office backgrounds.

The high school academic background needed for industries in this cluster would emphasize courses in math, the physical sciences, technology, drafting and using computers.

Something to Consider

The health of the industry corresponds very closely to the health of the economy because fewer homes and buildings are built when incomes are down, but there continues to be a need for people with a variety of skills.

Working in the construction industry often appeals to people who like to work outside, who enjoy the challenge of creating major structures or projects, who have an interest in how things are built, or who take pride in developing their own personal skills that can turn basic materials into something of beauty and function.

Some Examples of What a Student Might Do

Carpenters, plumbers and electricians are needed for every commercial or residential building project. ***Construction managers*** watch over all parts of a building project and keep it moving on time and on budget. ***Architects and architectural technicians*** make the drawings that guide the builder. ***Civil engineers*** design bridges and roads, while ***construction machine operators*** work the big machines that carry out their designs. ***Property managers*** keep apartment and office buildings running smoothly. ***Real estate developers*** arrange for people to buy land and to build on it.

CONSTRUCTION TECHNOLOGIES AND DESIGN CLUSTER

JOB CATEGORIES AND SELECTED JOB TITLES

Construction technologies and design professionals have identified the job categories and titles they project will be in demand over the next five years. Education level requirements are indicated for each job requirement so those students can plan their coursework accordingly. However, there is some flexibility within these educational guidelines. What is checked represents the minimum amount of education required.

Skilled Craft Apprentice

Primary Function: Perform a combination of job duties across related industries in accordance with National Apprenticeship Standards developed by the Bureau of Apprenticeship and Training, Employment and Training Administration, U.S. Department of Labor.

Job Title	H.S. Diploma	A.S.	BA/BS	Masters+
Automotive Mechanic	X			
Carpenter	X			
Concrete Worker	X			
Construction Craft Laborer	X			
Drafter (marine, mechanical, CAD Operator)		X		
Electrician	X			
Floor Installer/Finisher/Paving Surface Worker	X			
Instructor – Voc. Tech, Construction		X		
Insulation worker	X			
Laborer	X			
Mason	X			
Mechanic (heating, air conditioning, sheet metal)	X			
Operator (material moving equipment, excavation loading machines, grader, dozer and scraper)	X			
Painter/Paperhanger	X			
Plumber/Pipefitter	X			
Roofer	X			
Sprinkler Fitter	X			
Truck Driver	X			
Welder (H.V.A.C.R.)	X			

Specialist

Primary Function: Perform specialized job duties within a major aspect of the industry.

Job Title	H.S. Diploma	A.S.	BA/BS	Masters+
Appraiser	X			
Cost Estimator	X			
Inspector/Codes Enforcement*	X			
Quality Control Manager		X		
Security (hospitals, construction sites)	X			
Wetlands Enforcement Officer	X			

Management

Primary Function: Plan, organize, coordinate, and monitor the activities of workers performing multiple job duties to assure timeliness, safety, and profitability.

Job Title	H.S. Diploma	A.S.	BA/BS	Masters+
Building Manager	X			
Construction Supervisor/Manager			X	
Developer (esp. for retirement communities)			X	
Engineering Manager*				X
Facility Manager		X		
Industrial Engineer				X
Operations and Systems Analyst*				X
Management Analyst*			X	
Project Manager				X

Technician

Primary Function: Use measuring instruments to analyze data and determine compliance.

Job Title	H.S. Diploma	A.S.	BA/BS	Masters+
Construction Test Lab (Technician/Health Technician)		X		
Engineering Technician (mechanical, civil, environmental, legal)		X		
Environmental Lab Technician		X		
Surveyor/Mapper		X		

** = appears in other clusters*

⌘ = certification required

Repair Technician

Primary Function: Maintain, repair, troubleshoot, install and operate computer-based electronic equipment.

Job Title	H.S. Diploma	A.S.	BA/BS	Masters+
Computer Electronic Repairer		X		
General Maintenance Repairer	X			

Sales and Marketing

Primary Function: Identify product and market opportunities, communicate these opportunities to internal and external customers, sell the product or service, address customer needs and ensure customer satisfaction.

Job Title	H.S. Diploma	A.S.	BA/BS	Masters+
Customer Service Representative*		X		
Market Research Analyst*			X	
Marketing Assistant*			X	
Marketing Communications*			X	
Sales Representative – Scientific and Technical*			X	
Sales Supervisor – Scientific and Technical			X	

Environmental Scientists and Technologists

Primary Function: Study air, water, soil and chemical composition of the environment; along with environmental engineers, interpret and integrate the information to make recommendations for action or further study.

Job Title	H.S. Diploma	A.S.	BA/BS	Masters+
Environmental Laboratory Technologist			X	
Geologist, Geophysicist				X
Wetlands Ecologist				X

** = appears in other clusters*
⌘ = certification required

Health and Safety Specialists

Primary Function: These specialists establish health and safety standards for the work site based on scientific knowledge and legal requirements.

Job Title	H.S. Diploma	A.S.	BA/BS	Masters+
Environmental Engineer				**X**
Environmental Manager				**X**
Fire Protection Engineer			**X**	
Industrial Hygienist⌘			**X**	
Safety Engineer⌘			**X**	

Hazardous Waste Professionals

Primary Function: These professionals provide methods of handling, storing and disposing of hazardous waste materials in compliance with OSHA, EPA and company procedures.

Job Title	H.S. Diploma	A.S.	BA/BS	Masters+
Chemical, Waste & Water Analyst*			**X**	
Environmental Auditor*			**X**	
Risk and Hazard Evaluator*			**X**	
Pollution Control Engineer/Consultant*				**X**

Legal and Regulatory Professionals

Primary Function: Provide legal advice in the areas of product liability, patents and environmental law. Also advise on international, federal and state laws and actively lobby to protect financial interests of an organization.

Job Title	H.S. Diploma	A.S.	BA/BS	Masters+
Arbitrator/Mediator			**X**	
Attorney (expertise in environment, labor, export and trade law)⌘*				**X**
Claims Specialist*			**X**	
Code Administrator			**X**	
Government Relations Officer*			**X**	

** = appears in other clusters*

⌘ = certification required

Information Technology

Primary Function: Analyze, construct and design data processing systems. Apply scientific and technical knowledge to troubleshoot/repair problems in electronic data processing systems.

Job Title	H.S. Diploma	A.S.	BA/BS	Masters+
Computer Engineer*				**X**
Information Systems Analyst*			**X**	
Intelligence Transportation Systems Engineer			**X**	
Software Designer (used in architectural planning)*			**X**	

Design Specialists

Primary Function: Provide architectural and engineering and computer expertise to plan functional, safe, and attractive homes, workplaces or planned communities; assist designers with building processes, mechanical systems and computer-aided drafting support.

Job Title	H.S. Diploma	A.S.	BA/BS	Masters+
Acoustic Designer			**X**	
Architect				**X**
Architectural Associate		**X**		
Civil Engineer (transportation, geotechnical, environmental & structural)				**X**
Design Engineer*⌘			**X**	
Electrical and Electronic Engineer				**X**
Engineering Designer (acoustical, lighting)		**X**		
Graphics Designer*		**X**		
Industrial Designer		**X**		
Industrial Engineer⌘			**X**	
Interior Designer*⌘			**X**	
Landscape Architect⌘			**X**	
Lighting Design Engineer⌘			**X**	
Mechanical Engineer⌘*			**X**	

* = *appears in other clusters*

⌘ = *certification required*

Construction Technologies and Design (High School or Associate's Degree)

Technical Skills	Skilled Craft Apprentice	Specialist	Manage-ment	Technician	Repair Technician	Sales & Marketing	Design Specialist
Communication Skills:							
Write various reports	X	X	X	X	X	X	X
Prepare service bills	X	X	X	X	X	X	X
Establish and maintain customer dialogue (internal/external)	X	X	X	X	X	X	X
Conduct presentations		X	X	X	X	X	X
Data Interpretation:							
Interpret values from test equipment	X	X	X	X	X		
Interpret measuring instruments	X	X	X	X	X		X
Interpret blueprint specifications	X	X	X	X	X		X
Interpret and follow directions	X		X	X	X		
Use statistical techniques, including mean, median and standard deviation				X	X		
Estimate materials and volume	X	X	X	X	X	X	X
Interpret results from quantitative data	X	X	X	X	X	X	X
Interpret two-dimensional drawings	X	X	X	X	X	X	X
Determine quality level to decide whether or not to continue	X	X	X	X	X	X	X
Apply health and safety, environmental, and fire prevention compliance issues to job tasks	X	X	X	X	X	X	X
Apply OSHA safety and hazardous material regulations to job tasks	X	X	X	X	X	X	X
Apply legal requirements and government regulations to job tasks (codes, specifications, etc.)	X	X	X	X	X	X	X
Set quality criteria, and test outcome against criteria	X	X	X	X	X	X	X
Diagnostics							
Use basic hand tools	X	X	X	X	X	X	X
Test equipment	X	X	X	X	X		
Troubleshoot and repair equipment and/or recommend improvements			X	X	X		

Construction Technologies and Design (High School or Associate's Degree)

Technical Skills	Skilled Craft Apprentice	Specialist	Manage-ment	Technician	Repair Technician	Sales & Marketing	Design Specialist
Apply physics principles associated with mechanics, pneumatics, hydraulics, electronics and electricity to job tasks	X			X	X		X
Identify resources to complete a job task	X	X	X	X	X	X	X
Use programmable controllers	X	X	X	X	X	X	X
Build processes and prototypes according to internal product design, engineering instructions and customer specifications	X	X	X	X	X	X	X
Maintain inventory levels, quality, availability and flow	X	X	X	X	X		
Apply principles of electricity, plumbing, compressed air systems, HVAC systems and carpentry to job tasks	X	X	X	X	X	X	X
Tools, Equipment and Machines:							
Demonstrate mechanical aptitude	X	X	X	X	X	X	X
Concepts:							
Basic knowledge of general management principles	X	X	X	X	X	X	X
Basic knowledge of project management	X	X	X	X	X	X	X
Basic knowledge of cost analysis	X	X	X	X	X	X	X
Basic knowledge of ocntracts, bids and proposals	X	X	X	X	X	X	X
Computer Knowledge and Skills:							
Use CAD/CAM	X	X	X	X	X	X	X